A perspective in lifelong learning: m-learning for TT management training

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Abstract

This paper focuses on an experience of blended learning (blended e-learning and blended m-learning). This experience is ongoing at present for the training of managers of Technological Transfer (TT), who work in an Italian Scientific Technological Park (STP). The main activity of the STP is linked to technological transfer. In the STP the technological transfer manager is the key figure in the management of the transmission of scientific knowledge from the research world to the industrial dimension. In Italy there are various initiatives for the training of the TT manager, from universities and other public agencies, not referable to the academic institution in a strict sense. These projects, even though they are relevant in the Italian framework, do not satisfy the training demand of TT managers. First of all, the training model used in these experiences is still the traditional lesson face to face, and possesses an extremely abstract character. Secondly, there is the problem of time. Typically, the TT manager does not have long periods of time to spend on training during his work day.

The aim of this study is to make an experiment in a “Training course for the manager of technological transfer” in order to satisfy the training needs of the TT manager.

The course is based on the blended learning model, with the use of combined traditional educational methodologies which are:

1. e-learning methodologies in the first part;
2. m-learning methodologies in the second part.

In this paper, the experience of blended e-learning will not be described thoroughly, but will focalize on the blend m-learning experience, giving details of all its phases.

A perspective in lifelong learning: m-learning for TT management training

Introduction

This paper focalizes on an experience of blended learning (blended e-learning and blended m-learning). It is ongoing at present for the training of managers of Technological Transfer (TT) who work in an Italian Scientific Technological Park (STP).

Scientific technological parks

The main activity of the STP is linked to technological transfer. STP is a structure where companies can find valid support in terms of space, technologies and financing. STP is a privileged access channel for innovation and applied research, thanks to a system of integrated services available for companies situated inside the park and also for those all over the entire surrounding territory. Until 1995 there were only 3 STPs in Italy, at present there are 33.

The manager of technological transfer

In the STP the technological transfer manager is the key figure in the management of the transmission of scientific knowledge from the research world to the industrial dimension. The TT manager has various levels of competences and is able to talk to the research world as well as to industry. The TT Manager has the task of turning the functions-objectives of the research world towards the demands of industry and of government and also of simplifying the knowledge transfer from the research world to the business one (Diamantini, 2004).

Training TT Managers

The dynamics of innovation, even if they are very important for the national socio-economic system, are a circumscribed phenomenon (Lundvall, 1992; Patel and Pavittt, 1994). Because of the limited number of interested subjects and of the necessary high profile of excellence and of the enormous quantity of competences involved, the training processes must be considered the training of a highly specialized elite.

From the training of TT managers, various difficulties emerge when designing models for specific training situations. A first difficulty is tied to the formalization level of the highly specialized expertise, which constitutes the central nucleus of the competences on which the activity of the TT manager is based. Some of these competences can be based on knowledge linked to a concrete know how, others on an abstract and theoretical know that. However, it is clear that knowledge which is based on strictly academic educational processes, characterized by a high level of abstraction, translates into highly specialized training models which is often far away from the concept of problem solving. Instead, in the everyday scene the TT manager has to solve concrete problems, where not only academic-theoretic knowledge is required, but also practical knowledge. Therefore, the knowledge that a TT manager needs to do his work well must be composed of a complex mix between theoretical competences acquired from study and a set of practical competences, experience and know how accumulated in a professional ambit.

In Italy there are various initiatives for the training of the TT manager, from universities and other public agencies, not referable to the academic institution in a strict sense. These projects, even though they are relevant in the Italian framework, they do not satisfy the training demand of TT managers. First of all, the training model used in these experiences is still the traditional lesson face to face, and possesses an extremely abstract character. Secondly, there is

the problem of time. Typically, the TT manager does not have long periods of time to spend on training during his work day.

The blended learning course

After an analysis of the complex situation illustrated in the previous paragraphs, it was decided to make an experiment for the “Training course for the manager of technological transfer” in order to satisfy the training needs of the TT manager. This experience, which began in January 2005, is still ongoing in the STP Polaris, which was founded in 2003. It is about 40 km. from Cagliari.

In the Italian framework, the methodologies that were used are what are new about the course. The course is based on the blended learning model, with the use of combined traditional educational methodologies which are:

- e-learning methodologies in the first part;
- m-learning methodologies in the second part.

It was decided to use the blended learning methodologies since it is believed that both e-learning and m-learning present a series of pros and cons, as in all new applications. Therefore, the forms of blended learning are able to take advantage of the benefits of the technological innovation without having to sacrifice the strong points of the more traditional and consolidated modalities of a classroom setting.

The sample

The sample is made up of 15 people, of which 5 are men and 10 are women, between 29 and 43 years old (average age = 39,7). These people, after their university degree, in some cases

(6) they have a Master's degree and in other cases (2) they are working on their Doctorate degrees.

Blended e-learning experimentation

The experimentation of the blended e-learning model was made on four levels.

1. *needs analysis,* in this step the company indicates the organizational and individual shortages. The analysis of needs is supported by competency models which indicate learning and competences to be developed, through subsequent educational processes.
2. *design of the interventions,* educational interventions are designed after the training objectives which are intended to be followed and the modality of transmitting the competences of the models which have been selected.
3. *delivery of the training,* education processes are delivered, they are structured in further evolutive cycles that make the creation of new learning effective.
4. *assessments,* in this conclusive phase new elements which are produced and interiorized are integrated. They become part of the organization which codifies and assimilates them by making them part of the common patrimony shared by its members.

In this paper, the experience of blended e-learning will not be described in detail but will focalize on the results of the assessment phase, since these results were the starting point for the design of a blended m-learning experience.

Criticality which emerged in the course of the blended e-learning experimentation

There were three instruments used to analyze the results obtained from the blended e-learning experimentation. There was the double objective of understanding the qualities and characteristics of the sampling and the positive and negative aspects of the course:

1. a questionnaire about the correlated competences for a personal development plan (PDP), in which the objective was to show aptitudes and competences of the students;
2. assessment forms of the learning modules taken, used to identify the strong and weak points of the modules;
3. in depth interviews of the students to integrate with the questionnaires in order to finish the profiles.

The assessment shows that, on one hand, the students judged the contents positively; on the other hand, there is the limit created by the mental representation of a computer (understood as a desktop computer), which is seen only and exclusively as a work instrument and not as a lifelong learning instrument.

The students had difficulty becoming familiar with the computer instrument as a training and communication instrument and not only a work instrument. The first level of analysis is to represent the work instrument: all students work on a personal computer, but none of the students have taken an online course. Therefore representing the work instrument as a training instrument requires the structuring of an appositive learning path. For example, a pre-course would be useful to help the student become familiar with the instrument. According to the students an entry test would be useful, as a means to understand how the learning instrument can be effectively used.

Furthermore, as it was shown by the tracking of the platform accesses, almost all the students came on the platform during the work day at precise times. This let us understand how

the computer instrument is not a training instrument in the immediate future and how the training is not perceived as a continued and continuative process, but is still seen as a moment in itself that must not go beyond certain times during the day.

The blended mobile learning course

It is thought that m-learning can make up for the criticality that characterized the blended e-learning experience. In the blended m-learning we decided to:

1. administer a pre-questionnaire in order to understand how the learning instrument could be best used;
2. to familiarize the students with the instrument through: a first face to face meeting of the course where the Pocket PC is presented and distributed to the students; the fruition of a learning unit on mobile learning and a second face to face meeting to share doubts about the new learning typology.

In particular, it is thought that the mental representation of a mobile device is different from a desktop computer for the following multiple reasons:

1. the versatility and the wide use of the mobile device for teaching, a palmtop for example, easily becomes a multimedia screen for listening to music, looking at pictures and films;
2. as underlined by Graham (1997), Steinberger (2002) and Figg and Burston (2002), it is so easy to learn how to use a mobile device that normally an instruction booklet is not even necessary. In less than half an hour a new user is able to become familiar with the main functions of a new device and to acquire familiarity with its software in order to autonomously attend a course. This is due

to the fact that the major part of the users are using similar devices everyday, such as mobile phones. This consideration is not true for a personal computer where the lack of knowledge of the computer environment requires training sessions for at least one day for someone who does not have familiarity with a computer. It may require more time for the use of applicative environments.

3. the mobile device, different from the desktop computer, which for many people is bound to the work and the office environment, now accompanies the majority of the Italian people practically all the time and everywhere.

The experience of blended mobile learning can be divided into the following phases:

1. face to face meeting with the students, during which a pre-questionnaire is administered and the PocketPC is presented and distributed to the students;
2. fruition of a learning unit on mobile learning;
3. face to face meeting with the students to share doubts about the new learning methodology;
4. fruition of the didactic module on one of the topics taken from the needs analysis done in phase 1;
5. face to face meeting with the students for a discussion of their observations and the administration of the assessment questionnaire about the experience.

The experience, as previously explained is ongoing. Following, after having explained the model and the teaching strategies used, a brief explanation will be made of the didactic modules, the pre-questionnaire and the assessment questionnaire.

The Model and Didactics Strategies

The transformations in the current didactics used for mobile learning are mainly linked to the fact that the learning activity takes place through a new tool – the mobile device. And, just as on line didactics differ from face to face didactics, didactics via mobile devices must also take into consideration some elements that differ from face to face and on line didactics.

Obviously, these elements are not linked exclusively to the mobile device in itself, but to the peculiarities of mobile learning (that is the time gaps and places of its fruition). Just as on line didactics cannot be a simple transposition of personal didactics in the most traditional sense, the same is also true for didactics via mobile learning – it cannot be a mere transposition of on line didactics.

From the tests and studies carried out so far, it seems that they are quite flexible technologies which can support various models, from those based on the transmission of contents to those based on interaction, experience and the building up of knowledge.

Starting with these considerations, in each mobile learning object we decided to let the transmission of contents be followed by a topic for reflection or by homework, the results of which were shared during the next face to face meeting.

To create this didactic unit, the guidelines of Steinberger (2002) and Figg and Burston (2002) have been taken into consideration. According to them (as quoted by Trifonova and Ronchetti, 2003), “Modules should be short, and last no more than 5-10 minutes. Users should be able to use their small fragments of waiting or idle time for learning, by reading small pieces of data, doing quizzes or using forums or chat. Simple, fun and added value functionality. The computational power and other properties of mobile devices make it difficult in most cases to use complex and multimedia content, although devices of the same size are used for entertainment with great commercial success. It should be possible to use an m-learning system without

reading a user manual, and the experience of studying with the help of such devices should be interesting and engaging.”.

Introducing the contents to promote learning, we have followed the suggestions made by Mayer (1999). Thus, as this Californian psychologist affirms, we have:

- underlined the most significant information using titles, italics, bold, underlining, font sizes, icons and images;
- explained didactic purposes in order to claim the attention of the participants on the main contents;
- supplied short summaries;
- cancelled information and adopted a concise style in order to reduce “noise”.

To make it easier for the student to organize and process the new information, and help him to connect the selected representations in order to create a coherent mental representation, we have tried to:

- structure the text in a clear and comprehensible way, in particular we have explained the conceptual relations among its parts (cause/effect, confrontation/comparison, classification, and so on);
- supply an “outline” with the crucial passages;
- indicate the passages using key words;
- supply graphic representations to correlate the new concepts (i.e. schemes).

The Pre-questionnaire

The pre-questionnaire was created by selecting thematic areas from a survey made on scientific literature regarding mobile devices in general, and mobile learning in particular. It is divided into four parts.

In the first part, some free associations are requested (max 5) for four concepts – stimuli: mobile telephones, desktop, notebook and handheld computer. In the second part, participants are asked to give their opinion about the associations they gave: positive (+), neutral (0) or negative (-) ratings.

In the third part, they had to answer some questions about their own mobile devices and their use.

In the last part, some social-personal questions were asked, such as sex, age, residence, education, profession, average time to reach their place of work and the use of Internet.

The goal of this questionnaire is to understand how the learning instrument can be used, something which was not done in the blended e-learning experience. For this it is necessary to understand what mobile devices our subjects have, how they use them and how they are willing to use them.

The didactic modules

The didactic modules, in text format (ppt) and audio, constitute the learning objects which last approximately 10 minutes each. Every mobile learning object has a contents part followed by some reflections to follow (for example: “Try to reflect on one of the topics that was just presented to you …”) or a task to do (for example: “Collect material on one of the topics which was just presented ….”). The results of the reflections and the tasks will be shared with

the participants of the course in successive face to face meetings which will lead to the co-construction of common knowledge.

The Assessment Questionnaire

The areas to be investigated in the assessment of the quality of the mobile learning experimentation have been identified also in the literature about mobile learning. In particular, we have considered:

- the features of fruition typical of mobile learning, such as the chance to access the training contents anywhere and anytime;
- the features of the mobile device in itself, in this case the PocketPC, both in terms of hardware and software;
- the way the user feels the mobile device is as a learning tool;
- the structuring of the course both in terms of content organization the stimuli and homework assignments proposed.

The result expected from the analysis of the results obtained in the various areas, and considering the importance of the various *gaps*, had the purpose of identifying the areas of the training process where an intervention should be made in order to maximise the participants' satisfaction towards the training processes.

Regarding the features of the mobile devices in themselves, if subjects have never used a PDA before, they are asked if they had any problem using the Pocket PC. They are also asked to assess the following aspects using a 5-point Likert scale:

- readability of the contents on the screen;
- use of the pen;

- surfing and menu changing;
- screen colours;
- battery life;
- audio.

As for the fruition features, the space and time gaps during which the mobile device has been used to benefit from the didactic unit have been investigated and it has also been asked if using the PocketPC in public has been easy and accessible, or if it has been difficult. And if some difficulty was experienced, the student had to specify if it was caused by lack of concentration, reception, reading of the screen or by some other factor.

Regarding the course contents and organization, after a question about a general assessment of the course, the students are asked to assess, using another 5-point Likert scale, the proposed topic and its relationship with their training path. The students are asked to assess the stimuli and the homework assignments proposed at the end of each single mobile learning object, and also the final meeting with the trainer.

Finally, they had to indicate the three positive and the three negative points of the module and also the main problems they had found, making suggestions regarding the development of the module offered to them.

Conclusions

From this still ongoing experience of blended m-learning, it seems that this training method better suits the needs of TT Managers than blended e-learning. For example, mobile learning allows trainees to use times and spaces (i.e., the time for the transfer by bus from the city to the STP) which formerly, with blended e-learning, were “lost” to training activities. The

work with blended m-learning shows also that there is a need to develop teaching strategies that focus on those experiential elements capable of strengthening learning, building what in contemporary literature is called “learning experience”.

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Michelle Pieri, Phd in Psychology, is interested in distance learning, in particular mobile learning.

Table 1

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Figure Captions

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